

## WHAT IS CLAIMED IS:

*Substantive*

1. A method for providing access to a logical unit number of a shared storage system when a hardware failure occurs in a first of multiple input/output paths using a second of the multiple input/output paths, the method comprising mapping open options of the operating system to SCSI persistent reserve commands to allow all of the multiple paths to register with the logical unit number of the shared storage system and to allow the second of the multiple paths to access the logical unit number of the shared storage system after obtaining a persistent reservation with the shared storage system.

2. The method of claim 2 wherein the mapping open options of the operating system to SCSI persistent reserve commands to allow all of the multiple paths to register with the logical unit number of the shared storage system further comprises registering all paths from a first host with the logical unit number of the shared storage system using a single reservation key.

3. The method of claim 1 wherein the mapping open options of the operating system to SCSI persistent reserve commands further comprises obtaining information about persistent reservations and reservation keys.

4. The method of claim 3 wherein the obtaining information about persistent reservations and reservation keys further comprises using a reservation in command.

09687335-101300

Sub A1  
1  
5. The method of claim 4 wherein the reservation in command comprises  
2 a read key service action and a read reservation service action.

1 6. The method of claim 1 wherein the mapping open options of the  
2 operating system to SCSI persistent reserve commands further comprises issuing a  
3 persistent reserve out command for initiating an action with the logical unit number  
4 of the shared storage system.

1 7. The method of claim 6 wherein the persistent reserve out command for  
2 initiating an action with a logical unit number of the shared storage system further  
3 comprises a service action chosen from the group consisting of register, reserve,  
4 release, clear, preempt, register and ignore existing key, and preempt with abort.

1 8. The method of claim 7 wherein the register service action comprises  
2 an add and a remove option.

DO NOT SEE 28950

[illegible]

1        10. The method of claim 7 wherein the remove option further comprises:  
2        determining whether a path has a persistent reservation;  
3        issuing a persistent reserve out with service option release set when the path  
4        is determined to have a persistent reservation; and  
5        releasing the reservation when the when the path is determined to not have a  
6        persistent reservation.

090313Z # 101300

12. The method of claim 11 wherein the command parameter is a forced option, the forced open option causing the device to read the current reservation key, preempt and abort queued tasks when the current reservation key does not match the device's reservation key.

0969745103000

1           14.     The method of claim 11 wherein the command parameter is a retain  
2 reservation option, the retain reservation causing the device to read the current  
3 reservation key, determine whether a key is returned, establish that the logical unit  
4 number is not reserved by an initiator and make persistent reservation when a key is  
5 not returned.

Page 29  
**SJ09-2000-0174US1**  
 ALG 501.378US01  
 Patent Application

2 reserve option, the no reserve option causing the device to read the current  
3 reservation key, determine whether a key is returned, establish that the logical unit  
4 number is not reserved by an initiator and opening all paths with original command  
5 parameter from a host.

2 device to determine whether a returned key matches a reservation key for the  
3 device, to issue an error code when the returned key does not match the reservation  
4 key for the device, and when the returned key matches the reservation key for the  
5 device issue a persistent reserve out with release.

18. The method of claim 11 wherein the command parameter is a default reserve option, the default reserve option causing the device to check all paths, determine whether any paths are unregistered, register all unregistered paths, unregister any paths that do not register successfully, return and read a reservation key from the device, issuing an error code when the returned reservation key does not match a reservation key of the device and open all registered paths with no SCSI-2 reserve

[illegible]

2 device when a key is not returned to select a registered path, issue a persistent  
3 reserve for the selected registered path, ignoring the path if the persistent  
4 reservation is not successful, and when the persistent reservation is successful  
5 marking a reserve field with the path index that made the reservation and open all  
6 registered paths with the command parameter set to no SCSI-2 reserve.

1           20.    The method of claim 11 wherein the command parameter is a single  
2   option, the single option causing the device to check all paths, determine whether  
3   any paths are unregistered, register all unregistered paths, ignoring any paths that  
4   do not register successfully, return and read a reservation key, issuing an error code  
5   when the returned reservation key does not match a reservation key of the device  
6   and open all registered paths with no reserve set.

21. The method of claim 20 wherein the single option causes the device when a key is not returned to select a registered path, issue a persistent reserve for the selected registered path, ignoring the path if the persistent reservation is not successful, and when the persistent reservation is successful marking a reserve field with the path index that made the reservation and open all registered paths with the command parameter set to no reserve.

22. The method of claim 7 wherein the release service action comprises:  
closing all paths not reserved with a persistent reservation flag set;  
opening a path with a persistent reservation flag set; and  
issuing a persistent reserve out command with a release service action set to  
release a persistent reservation for a path.

23. A method for supporting SCSI persistent reserve commands by a  
shared storage system; comprising:  
processing reservation keys to identify registered hosts; and  
processing persistent reservation commands to control access by a host.

24. The method of claim 23 wherein the processing of persistent  
reservation commands comprises allowing all of the multiple paths to register with  
the logical unit number of the shared storage system

25. The method of claim 24 further comprising registering all paths from a  
first host with the logical unit number of the shared storage system using a single  
reservation key.

26. The method of claim 23 wherein the processing reservation keys  
comprises obtaining information about persistent reservations and reservation keys.

27. The method of claim 26 wherein the obtaining information about  
persistent reservations and reservation keys further comprises using a reservation in  
command.



006101"SEE/8960

28. The method of claim 27 wherein the reservation in command comprises a read key service action and a read reservation service action.

29. The method of claim 23 wherein the processing of persistent reservation commands comprises issuing a persistent reserve out command for initiating an action with the logical unit number of the shared storage system.

30. The method of claim 29 wherein the persistent reserve out command for initiating an action with a logical unit number of the shared storage system further comprises a service action chosen from the group consisting of register, reserve, release, clear, preempt, register and ignore existing key, and preempt with abort.

31. A driver for mapping open options of the operating system to SCSI persistent reserve commands, the driver configured to process reservation keys to identify registered hosts and to process persistent reservation commands to control access by a host.

32. The driver of claim 31 wherein the driver processes persistent reservation commands by allowing all of the multiple paths to register with the logical unit number of the shared storage system

33. The driver of claim 32 wherein the driver registers all paths from a first host with the logical unit number of the shared storage system using a single reservation key.

2 by obtaining information about persistent reservations and reservation keys.

2 persistent reservations and reservation keys by using a reservation command.

2 read key service action and a read reservation service action.

3 action with the logical unit number of the shared storage system.

4 release, clear, preempt, register and ignore existing key, and preempt with abort.

**Abstract**